Patent
Attorney Docket No. 4355

SPECIFICATION

BE IT KNOWN, that I, Herman K. Dupre, a citizen of the United States of America, residing at c/o Seven Springs, Champion, PA 15622, have invented certain new and useful improvements in:

HYDRANT STATION FOR SNOW MAKING APPARATUS

of which the following is a specification.

HYDRANT STATION FOR SNOW MAKING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to the art of making snow for ski resorts and the like. More particularly, it relates to improvements in apparatus utilized for mounting and controlling snow making apparatus for manufacturing snow for ski resorts.

Ski resorts utilize series of snow towers and/or snow guns on the ski slopes in order to manufacture snow with the combined use of water under pressure and compressed air in subfreezing ambient conditions. Ski resorts maintain crews of equipment operators whose job is to travel the mountain sides to turn the snow making equipment on or off and to make other adjustments as required in order to maximize the manufacture of man made snow and to minimize waste of such manufactured snow. The valves for valving air and water under pressure respectively to each snow tower are generally exposed and mounted adjacent each snow tower station. The valves are subject to freezing.

Also, if the snow making tower is being turned off, an additional drain valve must either be turned on or the water line actually disconnected from the hydrant to drain all water from the snow making device. Moisture can also accumulate in the air supply line and generally it must also be drained in order to prevent freeze-up in the supply lines or hoses leading from the hydrant to the snow making device.

To partially eliminate these problems, below surface control systems have been developed such as disclosed in the inventor's U.S. Patent Nos. 5,628,456 and 5,749,517. However, these below surface control systems require special underground structure which is expensive to construct and they do not solve the problem of draining the connecting hoses.

Another problem encountered with snow making equipment is that the compressed air supplied to each tower is extremely warm and there is no way provided under the prior art to precool this compressed air before supplying it to the snow making device.

Yet another problem encountered with present day hydrant stations for snow making towers is that the hydrant stations are time consuming to install.

It is a principal object of the present invention to provide a snow tower hydrant station for snow making equipment which eliminates or alleviates these aforementioned problems.

SUMMARY OF THE INVENTION

In one embodiment, the hydrant station of the present invention is adapted for mounting a snow making tower and connecting it to remote sources of air and water under pressure. Underground air and water pipes are respectively connected to remote sources of air and water under pressure, and air and water hydrant pipes are respectively connected to these underground air and water pipes for supplying air and water above ground. Above ground or below ground air and water

valves are respectively connected to these air and water hydrant pipes for valving air and water therefrom. The above ground exposed ends of the hydrant pipes are provided with couplings for coupling the hydrant pipes to a snow making device.

In a first embodiment of the present invention, a substantially vertical closed metal snow tower mounting pipe with a hollow interior is embedded in ground with portions exposed above ground for supporting a snow making tower thereon in conventional fashion as disclosed in the inventor's prior patents pertaining to snow making towers. However, in this embodiment, the improvement lies in the fact that the air hydrant pipe is connected to the interior of this snow tower mounting pipe whereby the interior portions of the mounting pipe constitute a segment of the air hydrant pipe itself and air under pressure supplied to the air hydrant coupling is thus circulated through above ground portions of the snow tower mounting pipe for cooling. Precooling of the air provides better quality snow at higher subfreezing temperatures.

The ground in which the mounting pipe is embedded may be provided in the form of a removable earth mound which not only insulates the underground portions from freezing, but further provides a protective mound around the snow making tower which helps to prevent skiers from becoming injured by engaging the hydrant pipes and snow tower mounting apparatus.

The hydrant station of the present invention for mounting a snow making tower is prefabricated prior to installation and includes an upright elongate water hydrant pipe having a hose coupling at its upper end for delivery of water under pressure to a snow making device, and a conduit

coupling at its lower end to connect it to a source of water under pressure in combination with an upright elongate closed metal mounting pipe for the snow making tower with a hollow interior. The upright mounting pipe is in juxtaposition with the water hydrant pipe, or substantially in parallel therewith, and extends upwardly beyond the upper end of the water hydrant pipe for supporting a snow making tower structure thereon. The mounting pipe and the water hydrant pipe are secured together with support ties.

An air inlet coupling is positioned on the mounting pipe for introducing air under pressure into the lower portions of the hollow interior from a source of air under pressure and a conduit coupling is positioned on the mounting pipe intermediate its ends for delivering air under pressure from the hollow interior to a snow making apparatus in the same fashion as previously described in order to precool the air. In this embodiment the hydrant station is provided as a unitary prefabricated apparatus which is therefore easily and quickly installed.

In another embodiment of the present invention, the hydrant station is provided with a hydrant drain coupling. This coupling includes a conduit coupling having at least three intercommunicating terminal coupling ports. A first one of these coupling ports connected to a drain valve. A second one of the coupling ports is connected to an inlet conduit coupler for coupling the conduit drain coupling to a fluid supply pipe, either water or air. A third one of the coupling ports provides an outlet for coupling to a snow making apparatus. The drain valve is preferably comprised of a spring biased check valve which is biased to open when a predetermined minimum pressure is

obtained in the conduit coupling. For example, this predetermined pressure might be selected to be in the approximate range of 20 to 30 psi.

The hydrant coupling may also include a fourth coupling port for the conduit coupling for providing an outlet port to couple a second snow making apparatus, whereby two snow making apparatus may operated from the same hydrant station. In this embodiment, it is preferred that a detachable plug is provided for selectively plugging one of the third or fourth ports. The plug may be tethered to the conduit so that it is not misplaced.

The hydrant drain coupling is usually utilized in pairs and is used in combination with adjacent water and air hydrants and one or more snow making apparatus having water and air inlets. In this combination, the hydrants have flexible hoses respectively connecting the water and air hydrant pipes to the inlet couplings for the snow making apparatus and the hydrant drain couplings of the present invention are respectively disposed in these hoses intermediate their ends for respectively draining the hoses when the predetermined low pressure level is attained therein. In this embodiment, the hose connections between the hydrant couplings and the hydrants and the snow making apparatus are selected to be sufficiently long whereby the hydrant drain couplings will rest on a ground surface which is lower than the points of connection of the hoses to the hydrants and the points of connection of the hoses to the inlets for the snow making apparatus. This facilitates the drainage of the hoses when the minimum predetermined pressures are attained therein.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages appear in the following description and claims. The accompanying drawings show, for the purpose of exemplification, without limiting the invention or appended claims thereto, certain practical embodiments illustrating the principals of this invention wherein:

FIG. 1 is a schematic view in side elevation illustrating the embodiments of the snow tower hydrant station of the present invention with portions thereof shown in vertical mid cross section;

FIG. 2 is a schematic view in side elevation illustrating the water supply portion of the hydrant coupling of FIG. 1; and

FIG. 3 is a schematic view in side elevation illustrating the air supply portion of the hydrant coupling of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, the snow tower hydrant station 10 of the present invention is schematically illustrated and includes underground air and water pipes 11 and 12 respectively which are connected to remote sources of air and water under pressure. Underground water valve

14 is connected to water pipe 12 for valving water therefrom through exit pipe 16. Exposed valve 13 valves air under pressure from underground air pipe 11.

Water valve handle 18 is provided approximately three feet above ground, or above the mound of earth 19 so it will not become buried in snow and is connected to connecting rod 21 which extends downwardly through jacket pipe 29 underground to valve 14 for turning it off and on by manipulating the handle 18. In this manner the water valve 14 is insulated below ground and will not freeze in subfreezing ambient conditions. For the same reason air valve handle 14 is positioned at about the same level.

The respective air and water valves 13 and 14 are in turn respectively connected to air and water hydrant pipes 22 and 23 for respectively supplying air and water under pressure above ground. Hydrant pipes 22 and 23 are also respectively provided with conventional couplings (sold under the trademark Evertite) for coupling the hydrant pipes respectively through hoses to a snow making device, such as a snow making tower. The air couplings 46 are male coupling parts and water coupling 25 is a female coupling part so as to assist the attendant in not mixing up the proper connections to the snow making device 35.

A vertical closed metal snow tower mounting pipe 30 has a hollow interior 31 which is part of and communicates with air hydrant pipe 22. Mounting pipe 30 is also embedded solidly about two to four feet (17) in ground 19 with base plate 26 and is exposed above ground for about five feet as illustrated at 20 for supporting the base 32 of a snow making tower 35 thereon. This

tower base 32 coaxially slides over the upper end of mounting pipe 30 and axially pivots thereon and further holds the snow making tower structure 35 in FIGS. 2 and 3 as is described in many of the inventors prior art snow making tower patents.

Because air hydrant pipe 22 is connected to the hollow interior 31 of mounting pipe 30, air under pressure supplied to air hydrant coupling 24 is first circulated through above ground portions 33, due to its warmth and circulating forces under pressure, whereby the air being supplied under pressure to coupling 24 is precooled or cooled before being supplied to a snow making device. This, of course, provides more efficient snow making and better quality snow.

The hollow interior 31 of ground support pipe 30 is sealed off airtight with a ground support plate 26 which is welded to the bottom of pipe 30. This mounting plate 26 is provided with corner notches 15 so that bolts or other fasteners may be used to anchor the bottom of the support pole 30 to underlying earth structure, such as rock. This support plate also assists in stabilizing the support of pipe 30 when the earth 19 is mounted thereon.

The hydrant station 10 is prefabricated for easy and quick installation in that the elongate water hydrant pipe 23 is secured with support ties 33 and 34 to mounting pipe 30. The support tie 33 and 34 are welded at their opposite ends respectively to their water hydrant pipe 23 and metal mounting pipe 30. Thus, the entire station 10 as illustrated in FIG. 1 is prefabricated as a complete hydrant station unit, with the exception of in ground water and air supply pipes 12 and 11. The entire prefabricated hydrant station 10 is then taken as a unit to the location where it is to

be installed and quickly installed as a unit by firmly securing base plate 26 and piling a mound of earth 19 over the base portion of mounting pipe 30 and the other below surface structure illustrated in FIG. 1.

With specific reference to FIG. 2 and 3, similar hydrant parts are numbered with the same reference numerals. FIG. 2 illustrates the water coupling from hydrant 23 to snow making tower 35, and FIG. 3 illustrates the coupling of air from air hydrant 22 to snow making tower 35. In each connection, a hydrant drain coupling 36 is disposed in the hose connections intermediate their ends. In FIG. 2, drain hydrant coupling 36 is connected to outlet coupling 25 of water hydrant 23 via a four foot length of flexible hose 37 and water hydrant drain coupling 36 is connected with a length of flexible hose 38 to the water inlet 39 of snow making tower 35.

In a similar fashion, referring to FIG. 3, air hydrant drain coupling 36 is directly coupled with coupling member 45 to outlet coupling member 24 of air hydrant pipe 22, 30 and air hydrant drain coupling 36 is in turn connected to the air inlet 41 of snow tower 35 via a length of flexible hose 42.

Note that in the configuration of FIG. 2 the outlet port 25 of water hydrant 23 is a female coupling and the outlet coupling portion 24 for the air hydrant 22 in FIG. 3 is a male coupling portion. This configuration helps to assist the attended in not making the mistake of incorrectly coupling the air supply to the water connection of the tower 35 and visa versa.

Each of the hydrant drain couplings 36 is comprised of a conduit coupling body 43 which has, in this illustration, four intercommunicating terminal coupling ports. The first coupling port is connected to drain valve 44. The second coupling port 45 is connected to the hydrant 22 or 23, and the third coupling port 46 is coupled to snow making apparatus or tower 35. Drain valve 44 is a conventional spring biased check ball valve which is biased to open when a predetermined minimum pressure of 20 to 30 psi is attained within the coupling.

A fourth coupling port 47 is connected through another section of flexible hose 48 for the water connection of FIG. 2, or 49 for the air connection of FIG. 3, to a second or secondary snow making apparatus (not shown).

A detachable plug 50 is provided for selectively plugging one of the third or fourth ports 46 or 47. Plug 50 is tethered to the coupling with a chain 51 so that it is not lost or misplaced.

The lengths of hoses 37, 38 and 48, are selected to be sufficiently long whereby the water hydrant drain coupling 36 will rest on a ground surface or otherwise be sufficiently lower than their points of connection to hydrant 23 and to the inlet 39 of the snow making apparatus for thereby facilitating the drainage of hoses 37, 38 and 48 for the structure of FIG. 2. For the air piping structure of FIG. 3, the coupling outlet 24 is positioned close to the ground surface 19 (approximately six inches) in order to insure good draining of hoses 42 and 49 through drain 44.

Referring again to FIG. 1, water hydrant pipe 23 is also provided with an underground coupling 36' which also is provided at its bottom with drain 44' that is of the same structure of the other spring biased drain valves 44 in order to insure full drainage of the water hydrant pipe 23 when not in use.